GEOTECHNICAL ENGINEERING REPORT

Proposed Hy-Vee Store
50th and O Streets
Lincoln, Nebraska

PREPARED FOR

Hy-Vee, Inc.
5820 Weston Parkway
West Des Moines, IA 50266

January 22, 2006

PREPARED BY

HWS
Solutions Through Service

HWS Consulting Group
825 J Street, Box 80358
Lincoln, NE 68501-0358
402.479.2200 • Fax: 402.479.2276
hws.com

January 22, 2006

Mr. Jeffrey Markey, P.E.
Asst. Vice President, Site Planning
5820 Weston Parkway
West Des Moines, IA 50266

REFERENCE: Proposed Hy-Vee Store
50th and O Streets
Lincoln, NE

Dear Mr. Markey:

HWS Consulting Group Inc. (HWS) is pleased to submit the enclosed report that summarizes the findings of a soil and foundation engineering study and provides recommendations related to the design and construction of the foundation for the referenced project.

If any questions arise concerning this report or if additional information is needed about foundation conditions at this site, please contact HWS for assistance.

Sincerely,

HWS CONSULTING GROUP INC.

Brandon Desh
Brandon L. Desh, E.I.

REGISTERED PROFESSIONAL ENGINEER
WILLIAM C. ARNESON
E-5883
STATE OF NEBRASKA

William C. Arneson, P.E.
Nebraska Reg. No. 5883

BLD\bld
Enclosures
52-87-3441
F:\Geodata\Projects\52-87-3441....\Hy-Vee50thandORPT.doc
F:Geodata\Reports\52873441-Hy-Vee50thandORpt.pdf
Orig. & 2 pc.: Hy-Vee, Inc.; Attn. Mr. Jeffrey Markey

GEOTECHNICAL ENGINEERING REPORT

Proposed Hy-Vee Store
50th and O Streets
Lincoln, Nebraska

Prepared
for

Hy-Vee, Inc.
5820 Weston Parkway
Des Moines, IA 50266

January 22, 2006

Prepared
by

HWS CONSULTING GROUP INC.
825 "J" Street
Lincoln, Nebraska 68508

CONTENTS

I. INTRODUCTION

Hy-Vee plans to construct a new store north of 50th and O streets in Lincoln, Nebraska. The project site is currently partially occupied with an existing building in the south half of the proposed building plan and parking area to the south. The proposed finished grades were not available at this time. The estimated maximum wall loads provided by Hy-Vee for the Hy-Vee store are 6 kips per linear foot and the estimated maximum column loads are 200 kips. The allowable settlement for the structure is less than one inch with differential settlement less than one-half inch. HWS Consulting Group Inc. (HWS) has prepared this report to present: (a) the findings of an exploration of the foundation soils at the project site, (b) the results obtained from laboratory tests, and (c) recommendations concerning the design and construction of the foundation for the proposed Hy-Vee Store.

Field and laboratory work consisted of: (a) making auger borings to determine the depth, thickness, and composition of each soil formation encountered to the depths of the borings, (b) performing a geologic study to determine the origin of the deposits underlying the site, and (c) performing standard tests to determine the engineering properties of the soil strata that would affect the performance of the structure.

An engineering evaluation has been made of subsurface conditions with respect to design and construction of the proposed Hy-Vee store. Recommendations are provided for the type of foundation, the allowable bearing pressure on the foundation soil, the minimum depth of footings, the modulus of subgrade reaction to be used in the design of footings and pavement structure, the protective slopes around the building, the types of soils to be used as fill and backfill, and the placement of fill and backfill.

II. SUBSURFACE EXPLORATION

A program of test borings and soil sampling was performed at the project site on December 5th and 6th, 2006. Nine (9) exploratory borings that were taken to depths of 10 to 20 feet below the existing grade to establish the general subsurface conditions of the area under consideration.

Penetration tests were performed with a CME Automatic Free-Fall SPT Hammer in accordance with ASTM D 1586-99, Standard Method for Penetration Test and Split-Barrel Sampling of Soils. Representative samples of soil were obtained for identification purposes. The resistance of the soil to penetration of the sampler, measured in blows per foot (N), is an indication of the relative density of cohesionless soil and of the consistency of cohesive soil. The borings were made in accordance with ASTM D 1452-80 (Reapproved 2000), Standard Practice for Soil Investigation and Sampling by Auger Borings. A machine-driven, continuous-flight auger having a diameter of 6 inches was used to advance the holes for thin-walled tube sampling. The bore holes were stable and casing was not required.

Fourteen (14) relatively undisturbed soil samples were recovered for visual observation and laboratory testing. This sampling was performed in accordance with ASTM D 1587-00, Standard Method for Thin-Walled Tube Sampling of Soil, utilizing an open-tube sampler having an outside diameter of 3.0 inches.

The vicinity map and the boring location plan are presented in Appendix A. The boring logs (refer to Appendix B) present the data obtained in the subsurface exploration. The logs include the surface elevations, the approximate depths and elevations of major changes in the character of the subsurface materials, visual descriptions of the materials in accordance with the criteria presented in Appendix C, groundwater data, and the locations of undisturbed samples of soil. The locations of the borings were determined by tape measurements from the northwest corner of the existing Barnes and Noble store southeast of the site. Elevations (approximate) at

the boring locations were determined by survey with reference to the finished floor elevation of the Barnes and Noble Store. The project plan provided by Hy-Vee indicated that the elevation of this benchmark is 1223.90 feet. Water level readings were made in the auger borings at times and under conditions stated on the boring logs.

III. LABORATORY ANALYSES

The undisturbed soil samples obtained during the subsurface exploration were examined in the laboratory by a member of HWS' professional engineering staff to supplement the field identification. Standard tests were performed on selected samples to determine the engineering properties of the foundation materials.

The moisture contents and dry unit weights of selected undisturbed soil samples were determined in the laboratory. These test results are presented in the boring logs opposite the respective sample locations. The moisture contents were determined in accordance with either ASTM D 4643-00, Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method, or ASTM D 2216-98, Standard Test Method for Determination of Water (Moisture) Content of Soil and Rock by Mass. The dry unit weights were determined in accordance with the Displacement Method of the Corps of Engineers, EM1110-2-1906, Appendix II, Unit Weights, Void Ratio, Porosity, and Degree of Saturation. These data correlate with the strength and compressibility of the soil. High moisture content and low density usually indicate low strength and high compressibility.

The unconfined compressive strengths of several undisturbed samples were estimated in the laboratory with a calibrated hand penetrometer. These strengths are presented on the boring logs and are estimates only. Actual values are generally lower than the estimated values indicated on the boring logs.

The compressibility of one undisturbed sample of sandy lean clay fill was determined in accordance with ASTM D 2435-96, Standard Test Method for One-Dimensional Consolidation Properties of Soils, except that time-rate readings were not obtained. The data from the consolidation tests can be used to develop an estimate of the maximum amount of settlement of the structure. A brief summary of the test data is presented in Table 1, and the complete test reports are presented in Appendix D.

TABLE 1
Consolidation Test Data

Boring No.	Depth ft	Initial Dry Density, lbf/ft^3	Overburden Pressure, tons/ft^2	Preconsolidation Pressure, tons/ft^2
3	1.6-2.3	87.4	0.44	2.5

IV. GEOLOGY AND SITE CONDITIONS

The city of Lincoln lies in the Dissected Till Plains section of Nebraska, a part of the Central Lowland province of the Interior Plains physiographic division[1]. The project site is located on a gently sloping, moderately well-drained foot slope north of 50th and O in central Lincoln. The site has been previously graded for existing site development and contains approximately 2 to 8 feet of existing fill.

The subsurface materials encountered at the boring locations are briefly described below in descending order of occurrence. Detailed descriptions are provided in the boring logs, which are presented in Appendix C.

Soil Zone	Description
Fill	Lean clay, lean clay with sand; trace to 25 percent fine to coarse sand; medium plasticity; wet; stiff to very stiff; encountered in all borings to a maximum depth of 8.0 feet.
Alluvium	Lean clay, lean clay with sand, clayey sand, lean to fat clay, silty clay; trace to 70 percent fine to coarse sand; low to high plasticity; wet; soft to very stiff; encountered in all borings except B-2, B-6, and B-9.
Subsoil	Fat clay; high plasticity; wet; very stiff; encountered beneath the fill in boring B-2 to a depth of 3.9 feet.
Peoria	Lean clay, lean clay with sand; trace to 30 percent fine sand; medium plasticity; wet; stiff; underlies the fill and subsoil in boring B-2.
Loveland	Sandy lean clay, lean clay, clayey sand; trace to 45 percent fine to coarse sand; medium plasticity; wet; stiff; encountered in borings B-2, B-6, and B-9.
Glacial Till	Sandy lean clay, fat clay, lean clay with sand; 5 to 45 percent fine to coarse sand; wet; medium stiff to very stiff; encountered in borings B-2, B-6, and B-9.

[1] Physiographic Provinces of North America, Map by A. K. Lobeck, 1948; The Geographical Press; Columbia University, New York

Groundwater was not encountered to the depth of borings. The water table could be expected to fluctuate several feet depending on surface drainage, rainfall, lawn watering, irrigation, vegetation, temperature, and other factors.

As stated in the introduction, a portion of the proposed building and parking area are currently occupied by an existing building. The existing building is to be demolished prior to construction of the proposed Hy-Vee store. Following demolition, the entire existing building foundation should be removed and properly backfilled with recommended backfill materials, placed in accordance with Recommendation 13.

V. DISCUSSION AND RECOMMENDATIONS

Four basic requirements for a satisfactory foundation of a structure are as follows:

a. The base of the foundation must be located below the depth to which the soil is subject to frost action and seasonal volume change caused by alternate wetting and drying.

b. The foundation (including the earth beneath it) must be stable or safe from failure.

c. The foundation must not settle or deflect enough to disfigure or damage the structure.

d. The foundation structure must be properly located with respect to any future influence that could adversely affect its performance.

The following recommendations for design and construction of the foundation for the proposed Hy-Vee store are based upon site conditions, the engineering properties of the subsurface materials, and the requirements of the proposed structure. As stated in the introduction all the details of the final building designs were not available at the time of this report. Following the finalization of the building design a review of these recommendations should be conducted by HWS.

1. Suitable Floor, Pavement, and Foundation Subgrade Material. The upper 0.5 feet of existing soils should not be used to support the floor slab, pavement structure, footings, or new fill. The remaining soils may be left in the building area and areas to be paved if these soils are "wet" and prove stable under a loaded dump truck or similar piece of equipment. By HWS' definition, a "wet" cohesive soil contains sufficient moisture to be rolled into a 1/8-inch-diameter thread without crumbling. A "moist" cohesive soil would crumble when being rolled to form a 1/8-inch-diameter thread. The remaining soils contain existing fill at some of the boring locations. HWS has no record of any compaction testing of the existing fill in place, therefore the existing fill is adequate for footings **if all** footing excavations are examined by the Geotechnical Engineer to verify that the footings will be seated on suitable foundation materials.

2. **Preparation of the Building Area and Areas to be Paved.** All vegetation and the upper 0.5 feet of existing soils should be removed from the building area and areas to be paved. Thereafter, the exposed ground located in areas that have been "cut" to the proposed subgrade elevations and areas to be filled should be proofrolled with a loaded dump truck or similar piece of equipment (in the presence of the Geotechnical Engineer) to locate unstable materials. Any unstable material should be either removed and replaced with controlled earth fill or reworked to conform to the moisture content and compaction recommendations presented in Table 4. The Geotechnical Engineer should observe the building area and areas to be paved to verify that all unsuitable and unstable soils have been either removed and replaced or reworked. Upon approval of the site by the Geotechnical Engineer, any exposed ground surface that has not been previously reworked should be scarified to a minimum depth of 6 inches and reworked to conform to the moisture content and compaction recommendations presented in Table 5. Areas to be filled should then be raised to the desired elevation with controlled earth fill. Immediately prior to placement of the pavement structure, the subgrade in cut and fill sections should be scarified to a minimum depth of 6 inches and reworked to a uniform condition conforming to the moisture content and compaction recommendations presented in Table 5. The footing excavations should extend into the suitable foundation materials as described above. The Geotechnical Engineer should observe all foundation excavations to verify that the footings will be seated in suitable foundation material.

3. **OSHA Excavation Requirements.** Excavations that will be occupied by personnel should be made in accordance with the Occupational Safety and Health Administration (OSHA) Construction Standards-29 CFR Part 1926, Subpart P-Excavations as published in the Federal Register, Vol. 54, 209, Tuesday, October 31, 1989, Rules and Regulations. OSHA states that a soil should be reclassified if the properties, factors, or conditions affecting the soil's classification change in any way. Sheet piling and/or shoring will be necessary if the sides of the excavations can not be sloped to meet OSHA regulations.

4. **Allowable Bearing Pressure.** The allowable net bearing pressure on the existing fill and natural materials located at or below the upper 0.5 feet or on new controlled earth fill is 2,000 lbf/ft^2.

5. **Settlement.** Settlement of the proposed Hy-Vee store is expected to be negligible (less than 1/4 inch) if the fill materials are properly placed (see Recommendation 13) and the recommendations in this report are carried out.

6. **Minimum Depth of Footings.** The bottoms of all exterior footings should be placed at a minimum depth of 40 inches below finished grade to provide reasonable protection against frost action and seasonal volume change.

7. **Lateral Earth Pressure.** Any retaining wall should be designed to withstand the pressure from the backfill. The pressure exerted by the backfill against the walls should be computed on the basis of the equivalent-fluid theory, by which the lateral pressure is considered to be caused by a fluid having a unit weight such that the total pressure of the soil and the so-called equivalent fluid are the same. The equivalent-fluid unit weights of the various recommended backfill materials, placed in accordance with Recommendation 13, are shown in Table 4. In order for the unit weights of sand to be applicable, the sand should occupy the area presented in Figure 1.

TABLE 4
Recommended Equivalent-Fluid Unit Weights

Soil Type	Equivalent-Fluid Unit Weight, lbf/ft^3	
	Restrained Wall	Unrestrained Wall
Clay	70	60
Sand	40	30

The values presented in the above table assume drained (non-saturated) foundation or retaining wall backfill.

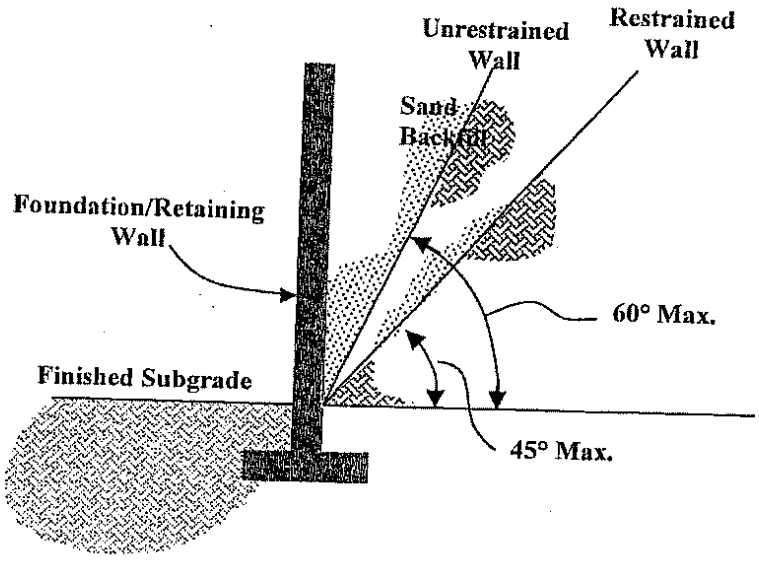


Figure 1. Required Area for Sand Placed Behind Basement-Type and Retaining Walls

8. **Retaining Wall Design.** A retaining wall must provide adequate stability against horizontal movement. The soil in front of the wall will provide passive-earth-pressure resistance as the wall tends to slide into the soil. In calculating the passive-earth-pressure resistance, the upper 40 inches (from finished grade) should not be assumed to contribute resistance against horizontal movement due to frost action and seasonal volume change of the soil. The suggested equivalent-fluid unit weight for calculating the passive-earth-pressure resistance is 170 lbf/ft^3 for non-saturated soil conditions and 120 lbf/ft^3 for saturated soil conditions. Additional resistance to horizontal movement will be provided by frictional resistance between the base of the footing and the foundation soil. At this project site, a retaining-wall footing would be seated in cohesive soil; therefore, the frictional resistance should be based on the cohesion of the soil. The suggested frictional resistance of the foundation soil is 750 lbf/ft^2. The backfill above a retaining wall footing will help resist

overturning of the wall. Wet unit weights of 120 and 115 lbf/ft^3 should be used in calculating the weights of cohesive and granular backfill, respectively, above a retaining-wall footing. A minimum factor of safety of 1.5 should be applied to the overall retaining-wall design. The maximum soil pressure beneath a retaining-wall footing should not exceed the bearing pressure presented in Recommendation 4.

9. Vertical Modulus of Subgrade Reaction. The suggested value of the vertical modulus of subgrade reaction to be used in the design of footings and pavement structure is 75 lbf/in^3.

10. Retaining-Wall Drains. A drainage system (consisting of a slotted drainpipe encased in granular filter material) should be installed behind any retaining wall to intercept surface water that might enter the backfill. The 4-inch-diameter drainpipes (with 1/8-in. slots) should be backfilled with fine aggregate for State of Nebraska "47B" concrete (hereinafter referred to as "sand-gravel"). The pipes should have a minimum of 4 inches of sand-gravel encasing the bottoms and sides, and the sand-gravel should extend to within 2 feet of finished grade. The 4-inch-diameter pipes should have a minimum of 4 inches of sand-gravel encasing the bottoms and sides.

The drains should discharge (a) into a sump from which the water can be pumped to a positive outfall, such as a drainage ditch, swale, or storm sewer or (b) by gravity to the low areas. An alternative to encasing the pipes with sand-gravel would be to wrap the lines with a geotextile. Fine sand could then be used in lieu of the sand-gravel.

11. Protective Slopes around the Building. The site should be graded in a manner that will divert water away from the building. The protective slopes around the building should meet the following requirements:

a. Slope downward from the building to lower areas or drainage swales.

b. Minimum horizontal length of 10 feet, minimum vertical fall of 6 inches (5 percent).

c. Minimum gradient (beyond 10 feet from building):

(1) Impervious surface; 1/8 inch per foot (1 percent).

(2) Pervious surface; 1/4 inch per foot (2 percent).

12. Types of Soils to be used as Fill and Backfill. Controlled earth fill placed within the building area and areas to be paved should be constructed of inorganic CL[2], ML[3], SM[4], and/or SC[5] materials (all with a liquid limit less than 50 and a plasticity index less than 30). The lean clay, lean clay with sand, sandy lean clay, clayey sand, and silty clay encountered at the project site are considered suitable for use as fill within the building area and areas to be paved.

The materials used as fill and backfill outside the building area and areas to be paved may consist of CL, ML, SM, SC, and/or CH (fat clay, fat clay with sand, and/or sandy fat clay). As previously discussed, any retaining-wall drain should be either embedded in sand-gravel or wrapped with a geotextile and bedded in fine sand. Any granular backfill should be capped with at least two feet of clay. Proposed fill and backfill materials should be subject to approval by the Geotechnical Engineer. Representative samples of the proposed fill and backfill materials should be submitted to the Geotechnical Engineer at least three days prior to placement so the necessary laboratory tests can be performed.

13. Placement of Fill and Backfill. The suggested basis for controlling the placement of fill and backfill on the site, excluding free-draining granular materials, are the "optimum moisture content" and "maximum dry density" as determined by ASTM D 698-00a, Procedure A, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using

[2] Lean clay, lean clay with sand and sandy lean clay.
[3] Silt, silt with sand and sandy silt.
[4] Silty sand.
[5] Clayey sand.

Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3). The recommended acceptable values of moisture content and degree of compaction are given in Table 5.

TABLE 5
Compaction Recommendations of Controlled Earth Fill and Backfill

Location	Soil Type	Minimum Moisture Content	Minimum Compaction*
Below top-of-interior-footing elevation in the building area.	Glacial Till	Optimum	95%
	Silts and Lean Clays	2% Below Optimum	95%
	Silty and Clayey Sands	**	100%
From 0.0 to 1.0 foot below pavement subgrade elevation outside the building area.	Glacial Till	Optimum	100%
	Silts and Lean Clays	2% Below Optimum	100%
	Silty and Clayey Sands	**	100%
(a) Above top-of-interior-footing elevation in the building area and (b) greater than 1.0 foot below pavement subgrade elevation outside the building area.	Glacial Till	Optimum	95%
	Silts and Lean Clays	2% Below Optimum	95%
	Silty and Clayey Sands	**	95%
Backfill of footings and utility trenches outside the building area and outside of areas to be paved.	Silts and Clays	2% Below Optimum	92%

* Percent of Maximum Dry Density (ASTM D 698-00a, Procedure A)
** Moisture as necessary to obtain density (near Optimum)

Clean free-draining sand used as backfill should be consolidated by means of a vibratory compactor to at least 55% "relative density", as determined in accordance with ASTM D 4253-00 (Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a

Vibratory Table) and D 4254-00 (Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculations of Relative Density).

14. Grading Observation. Observation and frequent testing by the Geotechnical Engineering Firm during compaction of fill and backfill are necessary to verify proper moisture content and degree of compaction. A professional opinion should be obtained from the Geotechnical Engineer that the site has been properly prepared, that all footings will be seated on suitable foundation materials, and that all fill, backfill, and subgrade materials conform to the moisture content and compaction recommendations presented above. If these testing and observation services are not performed, the allowable bearing pressure stated in Recommendation 4 may be invalid. As the Geotechnical Engineer for this project, HWS has interpreted the results of the subsurface exploration and laboratory tests to arrive at the recommendations presented in this report. Consequently, HWS is in the best position to relate actual observed conditions to those assumed for this report and to provide revised recommendations if differences are found during grading operations and construction of the foundation for the referenced project.

15. Subgrade Observation. The floor subgrade, pavement subgrade, and foundation materials should be observed by the Geotechnical Engineer immediately prior to placement of the concrete or paving components. Severe changes in the condition of these materials can occur after initial preparation as the result of rain, drying, freezing, and construction activities. Any subgrade or foundation material that becomes disturbed, desiccated, or does not conform to the moisture content and compaction recommendations previously presented should either be removed and replaced or reworked to meet these recommendations.

16. Applicability of Recommendations. The recommendations presented in this report are based in part upon HWS' analyses of the data from the soil borings. The boring logs,

and related information depict subsurface conditions only at the specific boring locations and at the time of the subsurface exploration. Soil conditions may differ between the exploratory borings and might change with the passage of time. The nature and extent of any variations between the boring locations or of any changes in soil conditions (e.g., drying of soil) might not become evident until grading operations and construction of the foundation for the referenced project have begun. If variations and changes in the soil conditions then appear, it will be necessary to re-evaluate the recommendations stated in this report.

VI. CONCLUSIONS

HWS concludes, on the basis of the findings of the subsurface exploration at the project site and the evaluation of the engineering properties of samples of the foundation materials, that the proposed Hy-Vee can be safely supported by spread footings seated on the existing fill if all footing are inspected by the geotechnical engineer, firm natural materials or controlled earth fill. HWS recommends a review of the above recommendations to ensure satisfactory performance of the structure once the final building design is determined.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices for exclusive use by Hy-Vee, Inc. for specific application to the proposed Hy-Vee and north of 50th and O Streets in Lincoln, Nebraska. The recommendations of this report are not valid for any other purpose.

HWS should be contacted if any questions arise concerning this report or if changes in the nature, design, or location of the structure are planned. If any such changes are made, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed by HWS and the conclusions of this report are modified or verified in writing. This report shall not be reproduced, except in full, without the written approval of HWS Consulting Group Inc.

Submitted By

HWS CONSULTING GROUP INC.

Prepared By:

Brandon Desh

Brandon L. Desh, E.I.

Reviewed By:

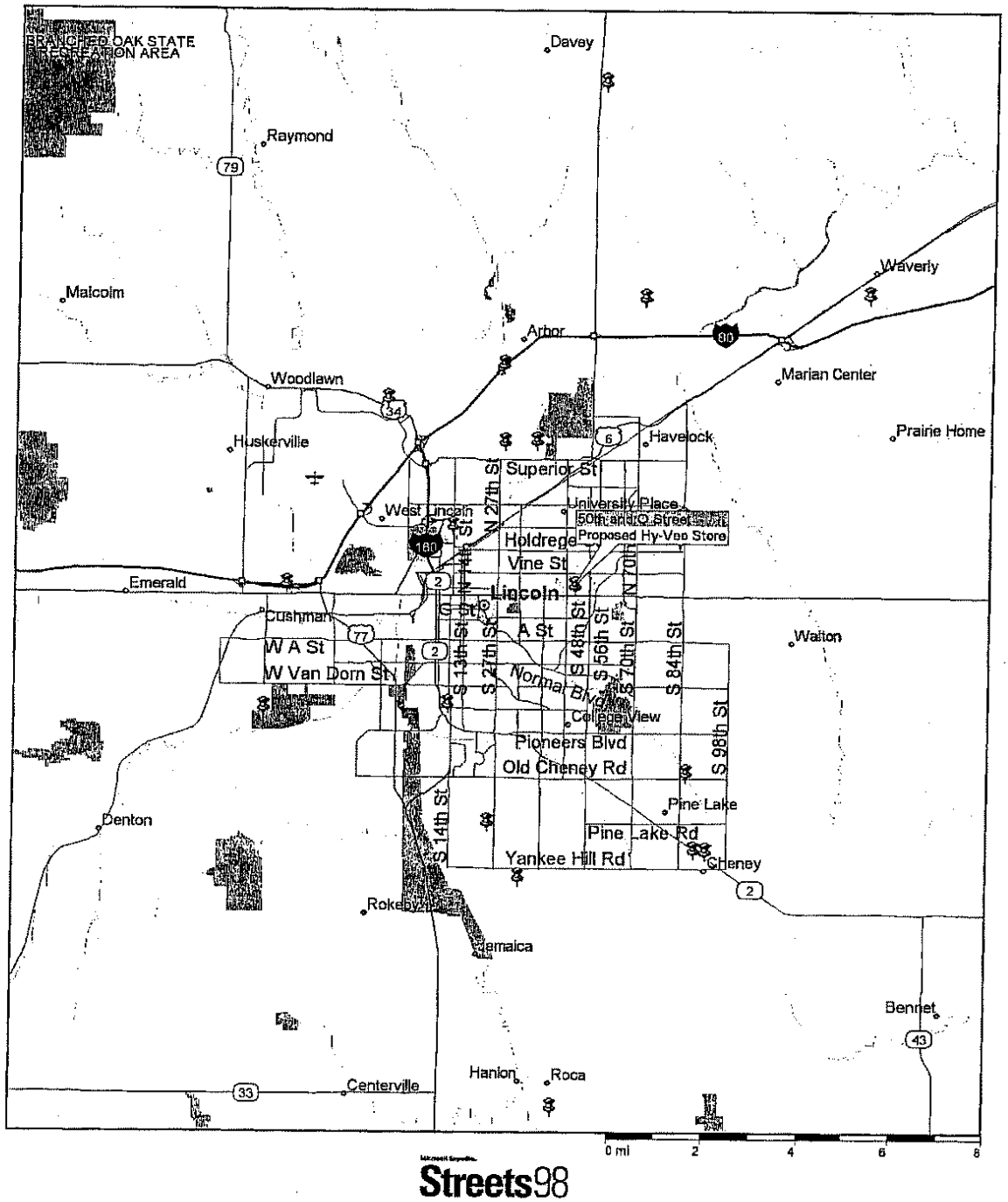
William C. Arneson, P.E.
Neb. Reg. No. 5883

PROFESSIONAL ENGINEER
WILLIAM ARNESON
STATE OF NEBRASKA

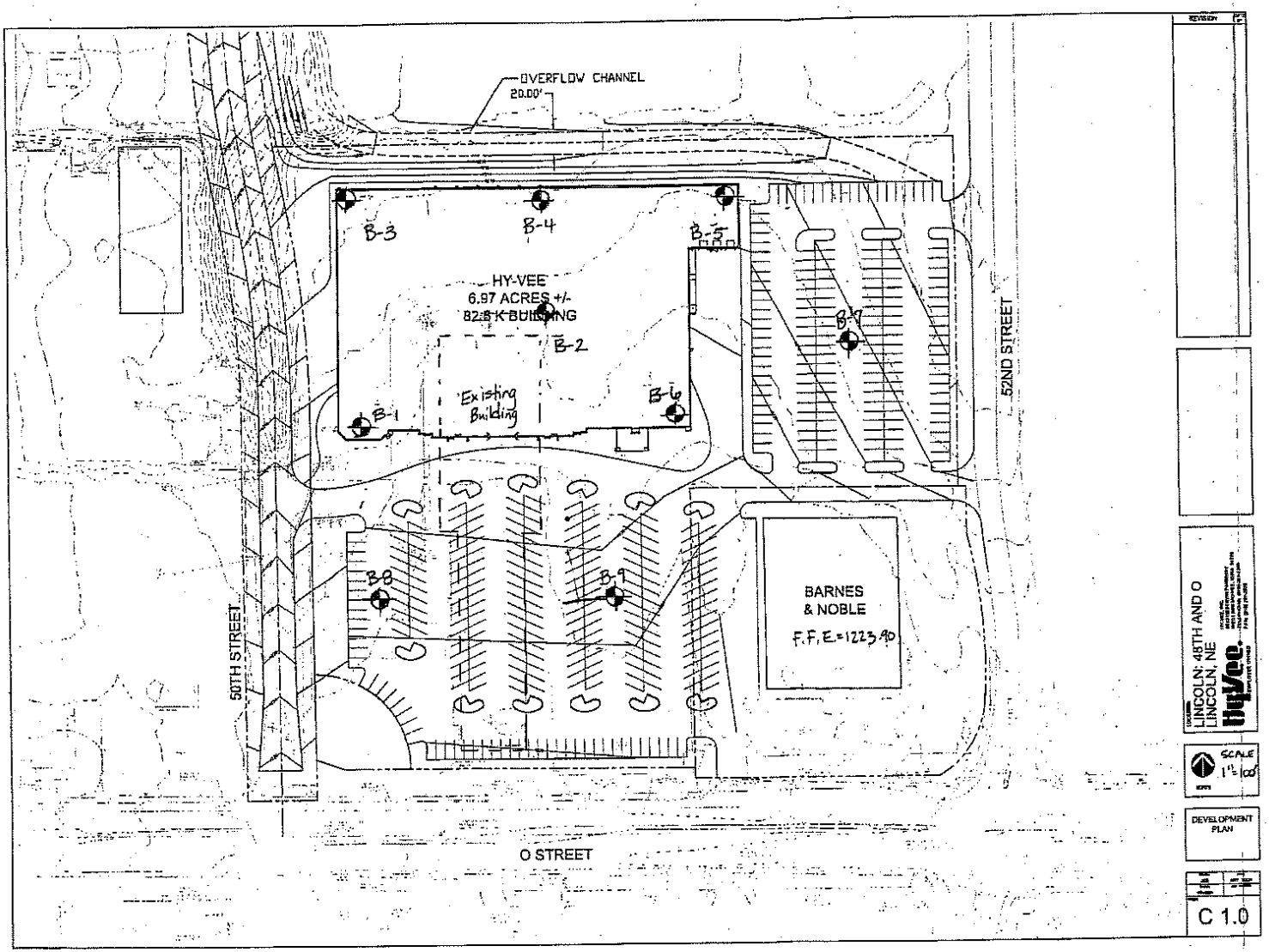
APPENDIX A VICINITY MAP AND BORING LOCATION PLAN

FIGURE A-1: VICINITY MAP

HY-VEE STORE, 50TH AND O STREET



Streets98



REVISION

LINCOLN: 48TH AND O
LINCOLN, NE

hyVee

SCALE
1" = 100'

DEVELOPMENT PLAN

C 1.0

HWS Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax: 402-479-2276

BORING LOG

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets, Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING No.: 1
SHEET 1 of 1
DATE: 12-5-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	SPT	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1219.1	0.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark grayish brown mottled with reddish brown; wet; stiff. (Fill)		5 4 6 7 (10)				0.0
1216.1	3.0		CL - LEAN CLAY; medium plasticity; very dark brown mottled with brown and black; wet; stiff. (Fill)	1	3 3 2	2.75*	98.3	25.7	2.5
1215.1	4.0		CL - LEAN CLAY; medium plasticity; dark greenish gray; wet; stiff. (Alluvium)		4 (5)				5.0
1214.1	5.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark grayish brown mottled with dark reddish brown; wet; stiff. (Alluvium)		2 3 5 7 (8)				7.5
1211.1	8.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark grayish brown mottled with dark reddish brown; wet; stiff. (Alluvium)		3 3 3 6 (6)				10.0
1209.1	10.0		CL - LEAN CLAY; medium plasticity; yellowish brown mottled with light brown; wet; stiff. (Alluvium)	2	2 2 2 2 (4)	2.25*	94.5	22.6	12.5
1207.3	11.8		CL-ML - SILTY CLAY; 0-5% fine sand; medium plasticity; dark yellowish brown; wet; medium stiff. (Alluvium)						
1206.1	13.0		CL-ML - SILTY CLAY; 0-5% fine sand; medium plasticity; dark grayish brown; wet; soft. (Alluvium)		1 2 1 2 (3)				15.0
1204.1	15.0		Boring Terminated at: 15.0ft						17.5
									20.0

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/23/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 1

HWS
Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax: 402-479-2276

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets
Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 2
SHEET 1 of 1
DATE: 12-5-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	SPT	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1218.6	0.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; greenish gray mottled with brown and dark brown; wet; stiff. (Fill)		5 4 6				0.0
1216.6	2.0		CH - FAT CLAY; high plasticity; very dark grayish brown; wet; stiff. (Subsoil)	3	6 (10)	2.75*	94.8	27.2	2.5
1214.7	3.9		CL - LEAN CLAY with Sand; 20-30% fine to medium sand; medium plasticity; greenish gray mottled with dark brown; wet; stiff. (Peoria)		7 4 6 8 (10)				5.0
1213.6	5.0		CL - LEAN CLAY; 10-20% fine to medium sand; medium plasticity; grayish brown mottled with yellowish brown; wet; stiff. (Peoria)		3 4 6 7 (10)				7.5
1210.6	8.0		CL - LEAN CLAY with Sand; 20-30% fine to coarse sand; medium plasticity; reddish brown mottled with dark grayish brown; wet; stiff. (Loveland)		2 3 3 6 (6)				10.0
1208.6	10.0		CL - SANDY LEAN CLAY; 35-45% fine to coarse sand; medium plasticity; reddish brown; wet; stiff. (Loveland)		2 3 4 6 (7)				12.5
1205.6	13.0		CL - SANDY LEAN CLAY; 35-45% fine to medium sand; medium plasticity; dark yellowish brown mottled with reddish brown; wet; stiff. (Glacial Till)		2 3 4 6 (7)				15.0
1203.6	15.0		CL - SANDY LEAN CLAY; 35-45% fine sand; medium plasticity; dark yellowish brown mottled with reddish brown; wet; stiff. (Glacial Till)		1 3 4 6 (7)				17.5
1200.6	18.0		CL - SANDY LEAN CLAY; 35-45% fine sand; medium plasticity; dark yellowish brown mottled with reddish brown; wet to saturated; medium stiff to stiff. (Glacial Till)		2 2 3 3 (5)				20.0
1198.6	20.0		Boring Terminated at: 20.0ft						

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/23/07

Figure B - 2

HWS
Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax: 402-479-2276

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets
Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 3
SHEET 1 of 1
DATE: 12-5-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	SPT	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1215.9	0.0		CL - LEAN CLAY with Sand; 15-25% fine to coarse sand; medium plasticity; yellowish brown mottled with grayish brown; wet; stiff. (Fill)						0.0
				1	1 3				
1214.4	1.5		CL - LEAN CLAY; 5-15% fine to coarse sand; medium plasticity; dark grayish brown mottled with grayish brown; wet; stiff. (Fill)	2	6	3*	98.9	24	
1213.5	2.4		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; grayish brown mottled with yellowish brown; wet; stiff. (Fill)		9				2.5
					(9)				
					3				
					3				
					3				
					4				
1210.9	5.0		CL - LEAN CLAY with Sand; 20-30% fine sand; medium plasticity; dark grayish brown; wet; stiff. (Alluvium)		(6)				5.0
					1				
					3				
					3				
1208.9	7.0		CL - LEAN CLAY; medium plasticity; dark greenish gray; wet; stiff. (Alluvium)		5	1.5*	88.2	27.8	
				3	(6)				7.5
					1				
					2				
1206.9	9.0		CL - LEAN CLAY with Sand; 20-30% fine sand; medium plasticity; light grayish brown mottled with reddish brown; wet; stiff. (Alluvium)		3				
					7				
1205.9	10.0		CL - LEAN CLAY; medium plasticity; light yellowish brown mottled with yellowish brown; wet; medium stiff. (Alluvium)		(5)				10.0
				4	2	2.25*	95.1	23.4	
					1				
					2				
1204.0	11.9		CL - LEAN CLAY with Sand; 10-20% fine sand; medium plasticity; light grayish brown; wet; soft to medium stiff. (Alluvium)		4				
					(3)				12.5
1202.9	13.0		CL - LEAN CLAY with Sand; 20-30% fine sand; medium plasticity; dark yellowish brown mottled with reddish brown; wet; soft to medium stiff. (Alluvium)		1				
					2				
					2				
					2				
					(4)				
1200.9	15.0		Boring Terminated at: 15.0ft						15.0
									17.5
									20.0

BORING LOG HYVEE8IITHANDOLOGS.GPJ HWS.GDT 1/23/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 3

HWS
Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax: 402-479-2276

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets
Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 4
SHEET 1 of 1
DATE: 12-5-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	SPT	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1216.7	0.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark grayish brown; wet; stiff. (Fill)		3 3 7 8 (10)				0.0
1213.7	3.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark grayish brown; wet; stiff. (Fill)		2 2 4 4				2.5
1212.7	4.0		CL - LEAN CLAY; medium plasticity; reddish brown mottled with light brown; wet; stiff. (Alluvium)	7	(6)	2.5*	102.7	19.6	5.0
1210.7	6.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark grayish brown; wet; stiff. (Alluvium)		2 3 4 7 (7)				7.5
1208.7	8.0		CL - LEAN CLAY with Sand; 15-25% fine to coarse sand; medium plasticity; light yellowish brown mottled with greenish gray; wet; stiff. (Alluvium)		1 3 4	1.3*	98.7	23.2	
1207.5	9.2		SC - CLAYEY SAND; 60-70% fine to coarse sand; yellowish brown; wet; medium dense. (Alluvium)	8	7 (7)	2.75*	107.9	19.5	10.0
1206.7	10.0		CL/CH - LEAN TO FAT CLAY; 20-30% fine sand; medium plasticity; light grayish brown mottled with reddish brown; wet; very stiff. (Alluvium)		2 3 7 10 (10)				12.5
1203.7	13.0		CL/CH - LEAN TO FAT CLAY; 20-30% fine sand; medium plasticity; light grayish brown mottled with reddish brown; wet; very stiff. (Alluvium)		2 5 6 10 (11)				15.0
1201.7	15.0		Boring Terminated at: 15.0ft						17.5
									20.0

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/23/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 4

HWS
Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax: 402-479-2276

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets
Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 5
SHEET 1 of 1
DATE: 12-6-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	SPT	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1217.9	0.0		Asphalt						0.0
1217.4	0.5		CL - LEAN CLAY; 10-20% fine to medium sand; medium plasticity; dark grayish brown; wet; very stiff. (Fill)		3 6 7 9 (13)				2.5
1214.9	3.0		CL - LEAN CLAY; medium plasticity; dark greenish gray mottled with dark brown; wet; stiff. (Fill)	9	2 2 3	2.1*	94.2	26.3	
1213.9	4.0		CL - LEAN CLAY; medium plasticity; greenish gray; wet; stiff. (Fill)		4				
1213.3	4.6		CL - LEAN CLAY; 10-20% fine to medium sand; medium plasticity; dark grayish brown; wet; stiff. (Fill)		(5)				5.0
1209.9	8.0		CL - LEAN CLAY with Sand; 20-30% fine to medium sand; medium plasticity; dark grayish brown mottled with reddish brown; wet; stiff. (Alluvium)		2 3 4 5 (7)				7.5
1207.9	10.0		CL - LEAN CLAY with Sand; medium plasticity; greenish gray slightly mottled with reddish brown; wet; medium stiff. (Alluvium)	10	1 1 2 2	2.6*	94.5	24.9	10.0
1205.9	12.0		CL - LEAN CLAY with Sand; 20-30% fine sand; medium plasticity; dark grayish brown mottled with red; wet; soft. (Alluvium)		(3)				12.5
1202.9	15.0		Boring Terminated at: 15.0ft		1 1 1 1 (2)				15.0
									17.5
									20.0

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/23/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 5

HWS
Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax: 402-479-2276

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets
Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 6
SHEET 1 of 1
DATE: 12-6-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	SPT	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1220.6	0.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark grayish brown; wet; stiff. (Fill)		3 3 3 4 (6)				0.0
1217.6	3.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark yellowish brown; wet; stiff. (Loveland)		2 3 4 7	2.2*	96.3	20.8	2.5
1216.6	4.0		CL - LEAN CLAY; 5-15% fine to medium sand; medium plasticity; reddish brown; wet; stiff. (Loveland)		(7)				
1215.8	4.8		CL - LEAN CLAY; 5-15% fine to medium sand; medium plasticity; dark yellowish brown mottled with dark brown; wet; stiff. (Glacial Till)	11	2 4 8 10 (12)	2.6*	105.8	19.2	5.0
1214.6	6.0		CL - LEAN CLAY; 0-5% fine sand; medium plasticity; dark yellowish brown mottled with reddish brown; wet; very stiff. (Glacial Till)						7.5
1212.6	8.0		CH - FAT CLAY; 0-5% fine sand; high plasticity; dark grayish brown mottled with reddish brown; wet; very stiff. (Glacial Till)		3 6 9 12 (15)				10.0
1210.6	10.0		CH - FAT CLAY; 0-5% fine sand; high plasticity; dark grayish brown mottled with reddish brown; wet; very stiff. (Glacial Till)		3 5 7 10 (12)				12.5
1207.6	13.0		CH - FAT CLAY; 0-5% fine gravel; 0-5% fine sand; high plasticity; dark grayish brown mottled with reddish brown; wet; very stiff. (Glacial Till)		2 4 7 8 (11)				15.0
1205.6	15.0		Boring Terminated at: 15.0ft						17.5
									20.0

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/23/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 6

HWS
Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax: 402-479-2276

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets
Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 7
SHEET 1 of 1
DATE: 12-6-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1216.6	0.0		CL - LEAN CLAY; medium plasticity; greenish gray slightly mottled with reddish brown; wet; very stiff. (Fill)	12	2.2*	100.6	22.7	0.0
1214.6	2.0		CL - LEAN CLAY with Sand; 20-30% fine sand; medium plasticity; dark grayish brown; wet; stiff. (Fill)					2.5
1211.6	5.0		CL - LEAN CLAY; 10-20% fine to medium sand; medium plasticity; dark grayish brown; wet; stiff. (Alluvium)					5.0
1208.6	8.0		CL - LEAN CLAY; 10-20% fine to medium sand; medium plasticity; dark grayish brown; wet; stiff. (Alluvium)					7.5
1206.6	10.0		Boring Terminated at: 10.0ft					10.0
								12.5
								15.0
								17.5
								20.0

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/23/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 7

HWS
Solutions Through Service

825 J Street
Lincoln, NE 68508
402-479-2200 * Fax 402-479-2276

PROJECT: Hy-Vee Store

LOCATION: 50th and O Streets
Lincoln, NE

JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 8
SHEET 1 of 1
DATE: 12-6-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1221.5	0.0		CL - LEAN CLAY; 10-15% fine to coarse gravel; 10-15% fine to medium sand; medium plasticity; dark brown mottled with brown; wet; very stiff. (Fill)					0.0
1220.7	0.8		CL - LEAN CLAY; medium plasticity; dark brown mottled with very dark grayish brown and light brown; wet; very stiff. (Fill)	13	3.25*	105.7	22.3	
1220.0	1.5		CL - LEAN CLAY with Sand; 20-30% fine to medium sand; medium plasticity; dark yellowish brown mottled with light grayish brown; wet; stiff. (Fill)		3.5*	118.0	8	2.5
1216.5	5.0		CL - LEAN CLAY with Sand; 20-30% fine to medium sand; medium plasticity; dark yellowish brown mottled with light grayish brown; wet; stiff. (Alluvium)					5.0
1214.5	7.0		CL - LEAN CLAY with Sand; 20-30% fine to medium sand; medium plasticity; greenish gray mottled with dark yellowish brown; wet; stiff. (Alluvium)					7.5
1211.5	10.0		Boring Terminated at: 10.0ft					10.0
								12.5
								15.0
								17.5
								20.0

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/23/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 8

HWS Solutions Through Service
825 J Street
Lincoln, NE 68508
402-479-2200 * Fax 402-479-2276

PROJECT: Hy-Vee Store
LOCATION: 50th and O Streets, Lincoln, NE
JOB NO.: 52-87-3441
RIG / METHOD: CME 75HT / Hollow-Stem
CREW: CL & NJ

BORING LOG

BORING No.: 9
SHEET 1 of 1
DATE: 12-6-2006

WATER LEVELS ▽ No groundwater encountered to the depth of boring.

ELEV (USGS)	DEPTH (feet)	LOG	LITHOLOGY DESCRIPTION	SAMPLE	qu (tsf)	DRY DENSITY (pcf)	MOISTURE (%)	DEPTH (feet)
1223.5	0.0		CL - LEAN CLAY; medium plasticity; dark brown mottled with light brown and black; wet; very stiff. (Fill)					0.0
				14	3.25*	105.7	22.3	
1221.0	2.5		CL - LEAN CLAY; 15-25% fine to medium sand; medium plasticity; dark yellowish brown mottled with reddish brown; wet; stiff. (Loveland)					2.5
1218.5	5.0		CL - LEAN CLAY; 15-25% fine to medium sand; medium plasticity; dark yellowish brown mottled with light grayish brown; wet; stiff. (Loveland)					5.0
1216.0	7.5		CL - LEAN CLAY with Sand; 20-30% fine to medium sand; medium plasticity; yellowish brown mottled with dark grayish brown; wet; stiff. (Glacial Till)					7.5
1213.5	10.0		Boring Terminated at: 10.0ft					10.0
								12.5
								15.0
								17.5
								20.0

BORING LOG HYVEE50THANDOLOGS.GPJ HWS.GDT 1/26/07

* Unconfined compressive strength was estimated using a calibrated hand penetrometer.

Figure B - 9

APPENDIX C.
CRITERIA USED FOR VISUAL SOIL CLASSIFICATION

TABLE C-1

Soil Classification Chart

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]			Group	Soil Classification Group Symbol	Soil Classification Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu≥4 and 1≤Cc≤3[E]	GW	Well-graded gravel[F]
			Cu<4 and/or 1 >Cc>3[E]	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	Cu≥6 and 1≤Cc≤3[E]	SW	Well-graded sand[1]
			Cu<6 and/or 1≥Cc≥3[E]	SP	Poorly graded sand[1]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI<4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried <0.75	OL	Organic clay[K,L,M] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried <0.75	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor		PT	Peat	

[A] Based on the material passing the 3-in. (77-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded with silt
GP-GC poorly graded gravel with clay
[D] Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
[H] If fines are organic, add "with organic fines' to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
[L] If soil contains ≥30% plus No. 200, predominantly sand, add "sandy" to group name.
[M] If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥4 and plots on or above "A" line.
[O] PI <4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.

TABLE C-2

CRITERIA FOR DESCRIBING MOISTURE CONDITION OF CLAY SOIL

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp, slightly wet, moisture content below plastic limit.
Wet	Moisture content above the plastic limit.
Saturated	Very wet. Usually soil is below water table.

TABLE C-3

CRITERIA FOR DESCRIBING MOISTURE CONDITION OF GRANULAR SOIL

Description	Criteria
Dry	Absence of moisture, dry to the touch.
Moist	Damp but no visible free water.
Wet	Visible free water.
Saturated	Usually soil is below water table.

TABLE C-4

CRITERIA FOR DESCRIBING CONSISTENCY OF CLAY SOIL

Density	Penetration Resistance, N Blows per 12 in.
Very Soft	Less Than 2
Soft	2-4
Medium	4-8
Stiff	8-15
Very Stiff	15-30
Hard	Greater Than 30

TABLE C-5

CRITERIA FOR DESCRIBING DENSITY OF COARSE-GRAINED SOIL	
Density	**Penetration Resistance, N Blows per 12 in.**
Loose	Less Than 10
Medium	10-30
Dense	30-50
Very Dense	Greater Than 50

TABLE C-6

CRITERIA FOR DESCRIBING STRENGTH OF ROCK	
Description	**Criteria**
Very soft	Permits denting by moderate pressure of the fingers.
Soft	Resists denting by the fingers, but can be abraded and pierced to a shallow depth by a pencil point.
Moderately soft	Resists a pencil point, but can be scratched and cut with a knife blade.
Moderately hard	Resistant to abrasion or cutting by a knife blade, but can be easily dented or broken by light blows of a hammer.
Hard	Can be deformed or broken by repeated moderate hammer blows.
Very hard	Can be broken only by heavy, and in some rocks, repeated hammer blows.

TABLE C-7

ROCK QUALITY DESIGNATION (RQD)

This is a general method by which the quality of the rock at a site is obtained based on the relative amount of fracturing and alteration.

The Rock Quality Designation (RQD) is based on a modified core recovery procedure that, in turn, is based indirectly on the number of fractures (except those due directly to drilling operations) and the amount of softening or alteration in the rock mass as observed in the rock cores from a drill hole. Instead of counting the fractures, an indirect measure is obtained by summing the total length of core recovered by counting only those pieces of hard and sound core which are 4 inches or greater in length. The ratio of this modified core recovery length to the total core run length is known as the RQD.

An example is given below from a core run of 60 inches. For this particular case, the total core recovery is 50 inches yielding a core recovery of 83 percent. On the modified basis, only 38 inches are counted the RQD is 63 percent.

CORE RECOVERY, in.	MODIFIED CORE RECOVERY, in.
10	10
2	
2	
3	
4	4
5	5
3	
4	4
6	6
4	4
2	
5	5
50	38

% Core Recovery = 50/60 = 83%; RQD = 38/60 = 63%

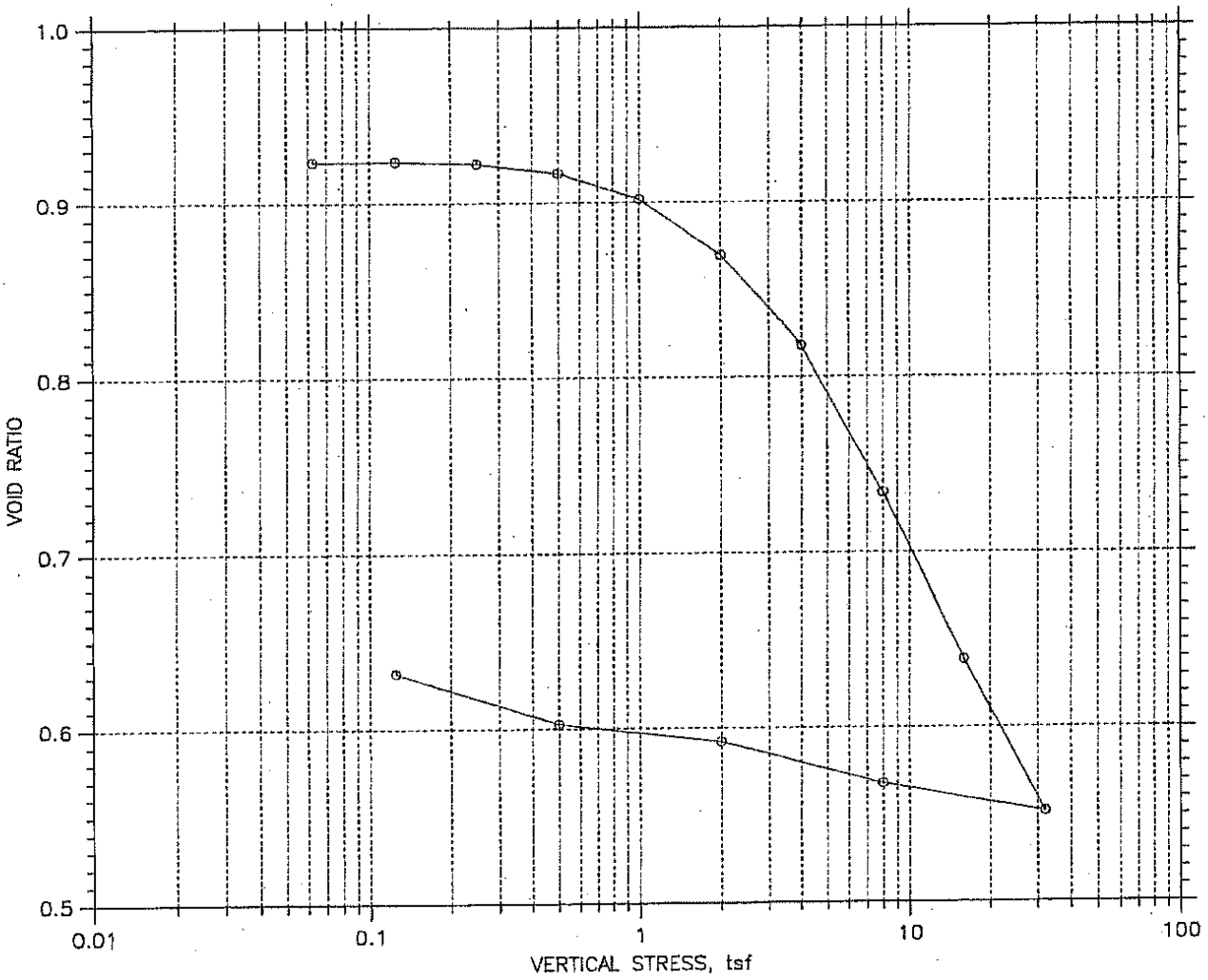
A general description of the rock quality can be made for the RQD Value.

RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 – 25	very poor
25 – 50	poor
50 – 75	fair
75 – 90	good
90 – 100	excellent

APPENDIX D: CONSOLIDATION TEST REPORT

CONSOLIDATION TEST DATA

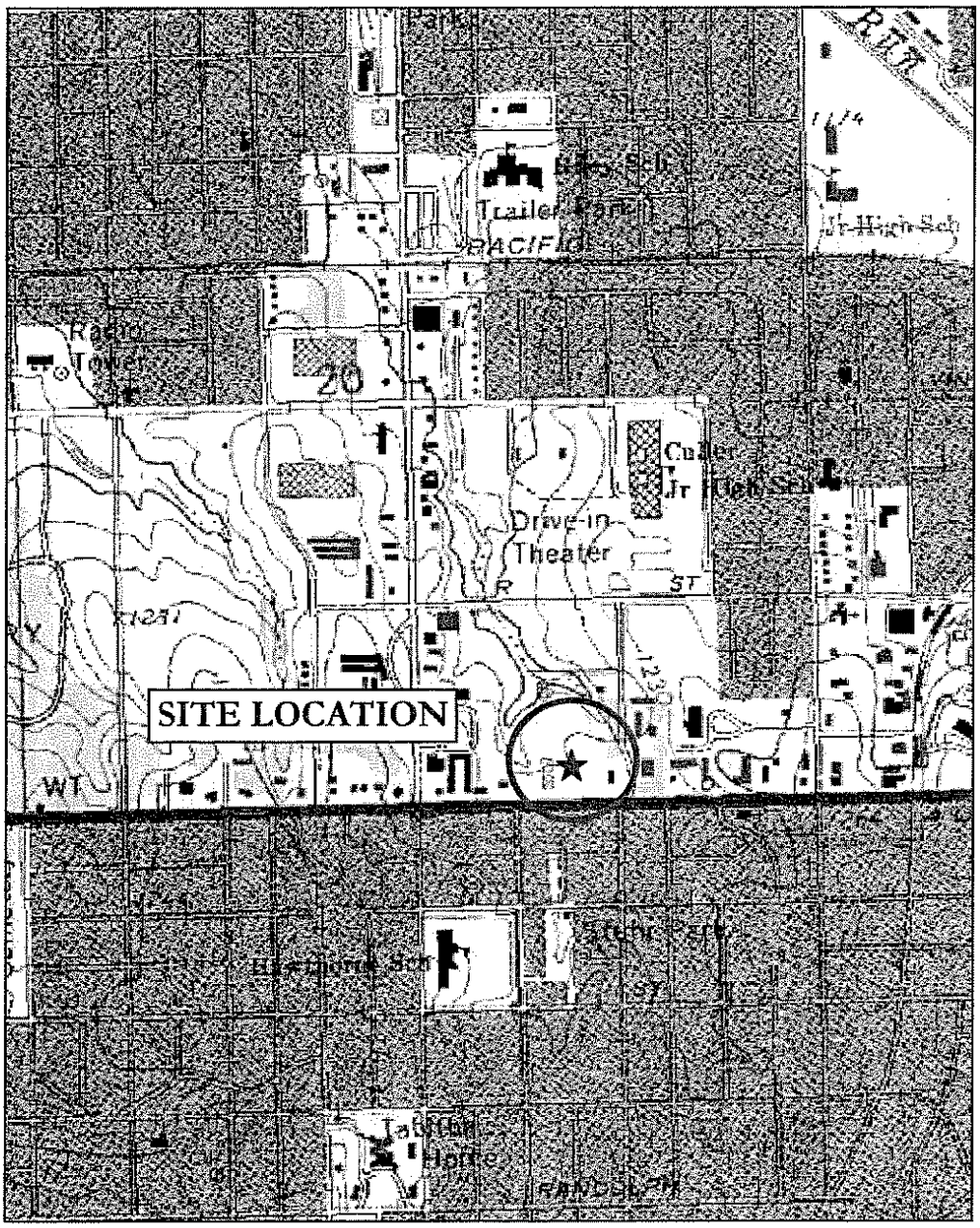
SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: 0.44 tsf				Water Content, %	30.19	23.39
Preconsolidation Pressure: 2.5 tsf				Dry Unit Weight, pcf	87.4	103.3
Compression Index: 0.33				Saturation, %	87.79	99.98
Diameter: 2.5 in		Height: 1.003 in		Void Ratio	0.93	0.63
LL: ---	PL: ---	PI: ---	GS: 2.70			

HWS Solutions Through Service	Project: Hy-Vee Store	Location: 50th & "O", Lincoln, NE	Project No.: 52-87-3441
	Boring No.: B-3	Tested By: JWM	Checked By: BLD
	Sample No.: T-2	Test Date: 12/29/2006	Depth: 7.0'-7.6'
	Test No.:	Sample Type: Natural	Elevation: 1208.9
	Description: Lean Clay		
	Remarks: ASTM D2435		

23-JAN-2007 15:09:23



1" ~ 1,250'

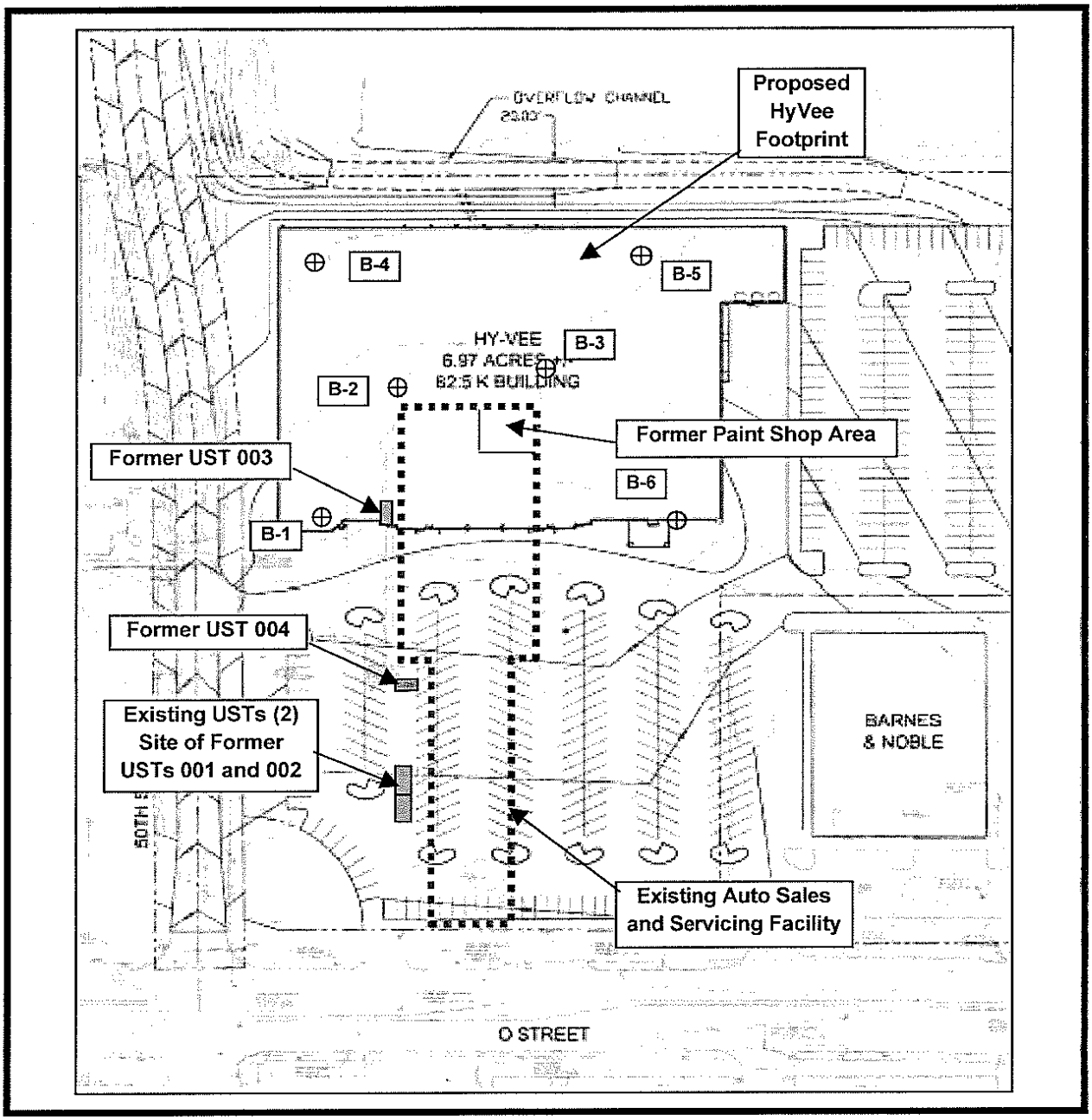
HWS
Solutions Through Service

USGS QUAD MAP

FIGURE 1
SITE LOCATION MAP

N

Brownfields Assessment Grant - 5000 "O" St.	November, 2006



1" ~ 120'

LEGEND

⊕ B-1 Proposed Soil Boring Location

N

HWS Solutions Through Service

FIGURE 2

SITE MAP

Brownfields Assessment Grant - 5000 "O" St	November, 2006

Chapter 10 - OUT-OF-SERVICE UST SYSTEMS AND CLOSURE REQUIREMENTS

001. OUT-OF-SERVICE TANKS.

001.01. TEMPORARILY OUT OF SERVICE TANKS. When an UST system is taken temporarily out of service, owners and operators must continue operation and maintenance of corrosion protection in accordance with §002 in Chapter 6, and any release detection in accordance with Chapter 7. Chapter 8 must be complied with if a release is suspected or confirmed. However, release detection is not required as long as the UST system is empty. The UST system is empty when all materials have been removed using commonly employed practices so that no more than 2.5 centimeters (one inch) of residue or 0.3 percent by weight of the total capacity of the UST system, remain in the system.

001.02. When an UST system is taken temporarily out of service for 3 months or more, owners and operators must also comply with the following requirements:

001.02A. Leave vent lines open and functioning; and

001.02B. Cap and secure all other lines, pumps, manways, and ancillary equipment.

001.03. When an UST system is taken temporarily out of service for more than 12 months, owners and operators must permanently close the UST system if it does not meet either performance standards in Chapter 4 for new UST systems or the upgrading requirements in Chapter 5, except that the spill and overfill equipment requirements do not have to be met. Owners and operators must permanently close the substandard UST systems at the end of this 12-month period in accordance with §§002-005 of this chapter, unless the State Fire Marshal provides an extension of the 12-month temporary out of service period. Owners and operators must complete a site assessment in accordance with §003 of this chapter before such an extension can be applied for. If an extension is granted, an owner or operator must perform a tightness test on the tank and piping prior to placing the tank back in service.

001.04. PERMANENTLY OUT OF SERVICE TANKS. When a tank is taken permanently out of service for more than 12 months, owners and operators must permanently close the UST system.

002. PERMANENT CLOSURE AND CHANGES-IN-SERVICE.

002.01. At least (30) days before beginning either permanent closure or a change in service under §002.02 and §002.03 below, owners and operators must notify the State Fire Marshal of their intent to permanently close or make the change in service.

002.02. To permanently close a tank, owners and operators must empty and clean it by removing all liquids and accumulated sludge. All tanks permanently closed must also be either removed from the ground or filled with an inert solid material. Permanent closures shall be done only by a licensed contractor (Chapter 3) and require a permit pursuant to Chapter 2.

002.03. Continued use of an UST system to store a non-regulated substance is considered a change-in-service. Before a change-in-service, owners and operators must empty and clean the tank by removing all liquid and accumulated sludge and conduct a site assessment in accordance with §003 below.

[*Note*: The following cleaning and closure procedures may be used to comply with this section:

American Petroleum Institute Recommended Practice 1604, "Removal and Disposal of Used Underground Petroleum Storage Tanks";

American Petroleum Institute Publication 2015, "Cleaning Petroleum Storage Tanks";

American Petroleum Institute Recommended Practice 1631, "Interior Lining of Underground Storage Tanks," may be used as guidance for compliance with this section; and

The National Institute for Occupational Safety and Health "Criteria for a Recommended Standard...Working In Confined Space" may be used as guidance for conducting safe closure procedures at some hazardous substance tanks.]

003. ASSESSING THE SITE AT CLOSURE OR CHANGE-IN-SERVICE.

003.01. Before a permanent closure or a change-in-service is completed, owners and operators must perform a closure assessment to measure for the presence of a release where contamination is most likely to be present at the UST site.

003.01A. If free product is present on the ground water or contamination discovered in the soils or in the ground water at the time a tank is removed, this sampling procedures portion of this assessment report does not need to be performed provided the Department of Environmental Quality is notified and the owner and/or operator begins remedial action in accordance with Department of Environmental Quality regulations.

003.01B. The requirements of this section are satisfied if one of the external release detection methods allowed in Chapter 7 is operating in accordance with the requirements in §004.05 and §004.06 of that chapter at the time of closure, and indicates that no release has occurred.

003.02. Analysis of samples. Soil and ground water samples taken at time of closure shall be analyzed by laboratory methods to detect and quantify the presence of the regulated substance last stored in the tank system.

003.02A. Samples shall be analyzed using test methodologies, procedures, and instrumentation approved by the Department of Environmental Quality. At a minimum the following additional requirements must be met:

003.02A1. Test methodology procedures regarding proper handling and preservation of samples shall be followed.

003.02A2. Proper chain of custody shall be maintained for each sample.

003.02A3. Samples shall be immediately sealed in their appropriate containers after collection.

003.03. In-Place Closure Assessment

003.03A. Soil borings must provide the necessary data to document site conditions. The soil borings shall be a minimum of two inches in diameter and be completed using a hollow stem auger drilling. Evidence of petroleum contamination in the soils or ground water and the corresponding depth of contamination shall be documented in the State Fire Marshal closure assessment report. Notification of any contamination shall be made in accordance with §004.02 of this chapter.

003.03B. Tank Assessment

003.03B1. One boring shall be drilled through the backfill at each end of each tank. If the distance between any of the borings exceeds 25 feet, as measured along the excavation perimeter, a boring midway between the two is necessary.

003.03B2. All borings shall continue until soil contamination or ground water is encountered. Borings may continue after contamination is discovered, but soil or ground water samples shall be collected at the point at which contamination is initially encountered; and

003.03B3. One soil sample shall be collected for every five (5) feet of boring advancement and each sample shall be analyzed in accordance with the procedures in §003.02 above. If ground water is encountered, one sample of ground water shall be collected and analyzed at the base of each boring.

003.03B4. Soil samples shall be collected in a manner to minimize disturbance of the soil structure. The predominant soil type of each sample (e.g., clay, sand, gravel) shall be recorded separately and submitted on a boring log as an addendum to the closure assessment report.

003.03C. Line Assessment

003.03C1. One boring shall be drilled at the point where the product lines leave the tank excavation.

003.03C2. One boring shall be drilled within three (3) feet of each dispenser island. The borings shall be placed in the best estimated down gradient direction of ground water flow.

003.03C3. If the running length of the product line between the borings required in (C1) and (C2) above exceeds 25 feet, additional borings shall be placed so borings are equally spaced and there is never more than 25 feet between any borings.

003.03C4. All product line borings shall conform to §003.03B2 of this chapter.

003.03C5. Samples shall be collected and analyzed as required in §003.03B3 and §003.03B4 of this chapter.

003.04. Removal Closure Assessment. All underground storage tanks and all product piping shall be inspected for corrosion holes and/or other points of leakage. A description of the inspection methods, and if leakage is verified, a description of the cause and location must be submitted to the State Fire Marshal in the closure assessment report. Notification of any contamination shall be made in accordance with §004.02 of this chapter.

003.04A. Each tank and its associated piping shall be visually inspected for holes, cracks, corrosion or any signs of leakage. All welds and seams must be thoroughly scraped and inspected. The capacity of each tank shall be recorded. Results of these inspections shall be documented in the State Fire Marshal closure assessment report.

003.04B. All piping must be exposed and inspected in place.

003.05. Tank Excavation

003.05A. Backfill material shall be removed to expose undisturbed native soils at the base of the excavation.

003.05B. The base of the excavation shall be inspected for contamination and, if present, the owner/operator has the option to over excavate all areas of contamination until clean soils are encountered. Overexcavation done in this manner is subject to Department of Environmental Quality remedial action regulations. To verify that soils are free of contamination, soil samples shall be collected and analyzed at this point.

003.05C. The final disposal location of contaminated soil shall be reported on the State Fire Marshal closure assessment report. Soil disposal procedures are subject to Department of Environmental Quality oversight.

003.05D. A minimum of two samples per tank shall be collected and analyzed from the undisturbed native soils at the base of the excavation. Sample locations shall correspond to points of leakage from the tank or line. If no leakage was found, one sample shall be collected and analyzed at each end of the tank at the base of the excavation. If ground water is encountered during sampling, the sample media must be water.

003.06. Line Excavation Assessment

003.06A. All product piping shall be removed by trenching and

exposing the entire length of the lines.

003.06B. The procedures described in §003.04A and §003.04B of this chapter shall be followed.

003.06C. A soil sample from native soil at the base of the piping excavation shall be collected and analyzed at areas of obvious contamination or points of leakage or, if no leakage is observed, one sample shall be taken every ten (10) feet, beginning at the tank excavation perimeter and extending to the dispensers.

003.06D. The base of the excavation shall be inspected for contamination and, if present, the owner/operator may over excavate according to the procedures in §003.05B and §003.05C above.

004. REPORTING REQUIREMENTS

004.01. Certification of Compliance

004.01A. A certification of compliance with Title 159 regulations shall be required for every closure or change in service.

004.02. Notification of Release

004.02A. Notification shall be made within 24 hours whenever contamination is discovered. The owner/operator shall report to the Nebraska Department of Environmental Quality and the State Fire Marshal in accordance with Chapter 8 of this title.

004.02B. When public safety threats are identified during a closure assessment, the State Fire Marshal shall be notified immediately.

004.03. Closure Assessment Report

004.03A. The owner/operator is responsible for ensuring the closure assessment report is properly completed and submitted on the appropriate State Fire Marshal reporting forms. The report shall be submitted to the State Fire Marshal with 45 days of the date of removal or closure in place. This report shall contain at a minimum:

004.03A1. The sample custody record, the name of the laboratory that was used and the original laboratory data sheets shall be submitted with the report.

004.03A2. A site drawing of the tank system (tanks and product lines) placement and/or excavation and dispenser(s) location. The site drawing shall be to scale, including distances and directions as measured. The relationship of the tank system to permanent objects, such as curbs or buildings, must be depicted in order to facilitate location at a later date. The location of the facility shall be placed on a separate map (e.g., 7.5 minute quadrangle, city, county, highway, hand drawn) or described in a narrative. The map or narrative shall provide the exact location of the facility in relation to cross streets or other map benchmarks.

004.03A3. The location at which samples were collected.

004.03A4. The type of regulated substance last stored in the tank.

004.03A5. A description of the contaminated soil disposal method and final disposal location.

004.03A6. The completed Certification of Compliance.

004.03A7. The completed tank closure checklist.

004.03A8. The actual tank dimensions.

004.03B. The report shall be submitted to:

State Fire Marshal
Flammable Liquid Storage Division
246 South 14th Street
Lincoln, NE 68508-1804

005. APPLICABILITY TO PREVIOUSLY CLOSED UST SYSTEMS

When directed by the State Fire Marshal, the owner and operator of an UST system permanently closed before January 1, 1989 must assess the excavation zone and close the UST system in accordance with this chapter if there is a reasonable probability that releases from the UST may, in the judgment of the State Fire Marshal, pose a current or potential threat to human health and the environment.

006. CLOSURE RECORDS.

Owners and operators must maintain records in accordance with §006 in

Chapter 6 that are capable of demonstrating compliance with closure requirements under this chapter.

Legal Citation: Title 159, Chapter 10
Nebraska State Fire Marshal

CITY OF LINCOLN
STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

PROJECT: 5000 "O" Street – Demolition and Grading Project

Purpose: A major goal of pollution prevention efforts during project construction is to control soil and pollutants that originate on the site and prevent them from flowing to surface waters. The purpose of this SWPPP is to provide guidelines for achieving that goal. A successful pollution prevention program also relies upon careful inspection and adjustments during the construction process in order to enhance its effectiveness.

Project Description: This is a demolition and site grading project. The purpose of this project is to clear and grade the site to be ready for a commercial urban redevelopment project. The project also involves the removal of two underground storage tanks and any impacted soils encountered during the project. Described below are the major construction activities:

1. Install stabilized construction entrance/exit. This will be the first construction work on the project.
2. Install sediment barriers down slope from construction activities that disturb site soil.
3. Construct rock surface for temporary parking and storage areas as necessary.
4. Clear and grub the site.
5. Begin grading the site.
6. Install inlet protection around all adjacent storm sewer structures as necessary.
7. Start construction of drainage facilities.
8. Temporarily seed disturbed areas.
9. Complete final grading and apply cover seeding.
10. Remove all temporary erosion and sediment control devices only after site is stabilized.

The actual schedule for implementing pollutant control measures will be determined by project construction progress. Down slope protective measures must always be in place before soil is disturbed.

Existing Site Conditions: The existing site is that of an old car lot. The existing building and parking areas are dilapidated and prime for a redevelopment project. There is an open drainage way bordering the northwest corner of the property.

Adjacent Areas: The areas surrounding the project are an urban setting. The area is bordered by "O" Street (6-lane, concrete, curb and gutter roadway) and a commercial business on the south, 52nd Street (3-lane, asphalt, curb and gutter roadway) on the east, 50th Street and an open channel on the west, and commercial businesses on the north.

Offsite Areas: It is not anticipated that any offsite areas will be involved with land disturbing activities.

Soils: The predominate soil on site is Urban land – Judson complex, 1 to 3 percent slopes; Urban land – Wymore – Sharpsburg complex, 2 to 7 percent.

CITY OF LINCOLN
STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

PROJECT: 5000 "O" Street – Demolition and Grading Project

Critical Areas: No critical areas for potentially serious erosion problems from the site have been identified. There is an open channel bordering the site that will need to be protected from erosion and run-off.

Erosion and Sediment Control Measures: The following measures are proposed for this project:

- Down slope protective measures must always be in place before soil is disturbed, including silt fence installation. The fence is designed to retain sediment-laden water and allow settlement of suspended soils before the storm water flows through the fabric for discharge downstream. Silt fence shall be located to capture overland low velocity sheet flows. In areas of steeper slopes or highly erodible soils, wire-reinforced silt fence shall be used.
- Existing open channel will be protected by use of silt fence and maintaining existing vegetation for buffer areas.
- Materials resulting from the clearing and grubbing or excavation operations shall be stockpiled up slope from adequate sedimentation controls. Materials removed to an off-site location shall be protected with appropriate controls and properly permitted. All stockpiled soils shall be covered and/or silt fence installed around the perimeter to prevent discharge of materials.
- All storm sewer inlets that are made operable during construction shall be protected so that sediment-laden water cannot enter the conveyance system without first being filtered or otherwise treated to remove sediment.
- Construction entrance/exit in compliance with the Lincoln Drainage Criteria Manual, current edition and approved supplements, shall be constructed by the Contractor at any point where vehicular traffic will be entering or leaving the construction site to reduce vehicle tracking of sediments.
- Water trucks will be used as needed during construction to reduce dust generated on the site.
- All waste materials will be collected and properly stored and disposed of. All personnel will be instructed regarding the correct procedure for waste disposal.
- All sanitary waste will be collected from the portable units and properly disposed of frequently enough to avoid overfilling.
- Good housekeeping and spill control practices will be followed during construction to minimize storm water contamination.
- All vehicles on site will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
- Petroleum products will be stored in tightly sealed containers which are clearly labeled.
- Spill kits will be included with all fueling sources and maintenance activities.
- Any asphalt substances used onsite will be applied according to the manufacturer's recommendation.
- All chemical compounds will be properly stored and tightly sealed when not in use. Excess materials will not be discharged to the storm sewer system, but will be properly disposed of according to the manufacturer's instructions.

- Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on site. If it's necessary to have wash out on site, appropriate sites will be designated and designed to properly handle the anticipated water. Wash water shall be contained, treated and allowed to infiltrate whenever possible.

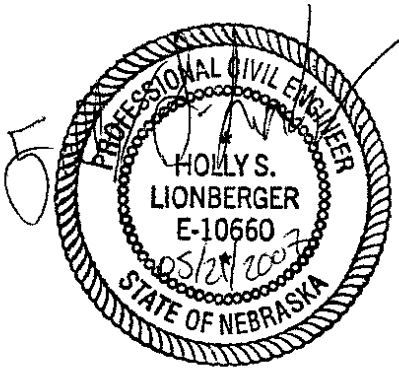
Permanent Stabilization: Disturbed areas will be seeded with cover crop until the redevelopment project moves forward with building and paving.

Stormwater Runoff and Management: This project will not cause an increase in peak runoff rates from the site. With the re-grading of the site, stormwater runoff will be directed to the northeast corner of the property where it will drain along the north property line to the existing open channel protected by filter fabric; and to a temporary lateral storm sewer system with drain basins protected by filter fabric storm drain inlet protection.

Spill and Mitigation Plan: Spills of hazardous materials shall be contained and cleaned up immediately. Any contaminated soils or materials shall be removed and treated or disposed of (as appropriate) in accordance with NDEQ and EPA guidelines. Spills large enough to reach the storm sewer system will be reported to the National Response Center at 1-800-424-8802. The attached Spill Report form will be completed and maintained onsite with the SWPPP and erosion control sheets.

Inspections: Inspections will be as given in the attached Special Provisions. The attached Stormwater Construction Site Inspection Report will be completed with each inspection and maintained onsite with the SWPPP and erosion control sheets.

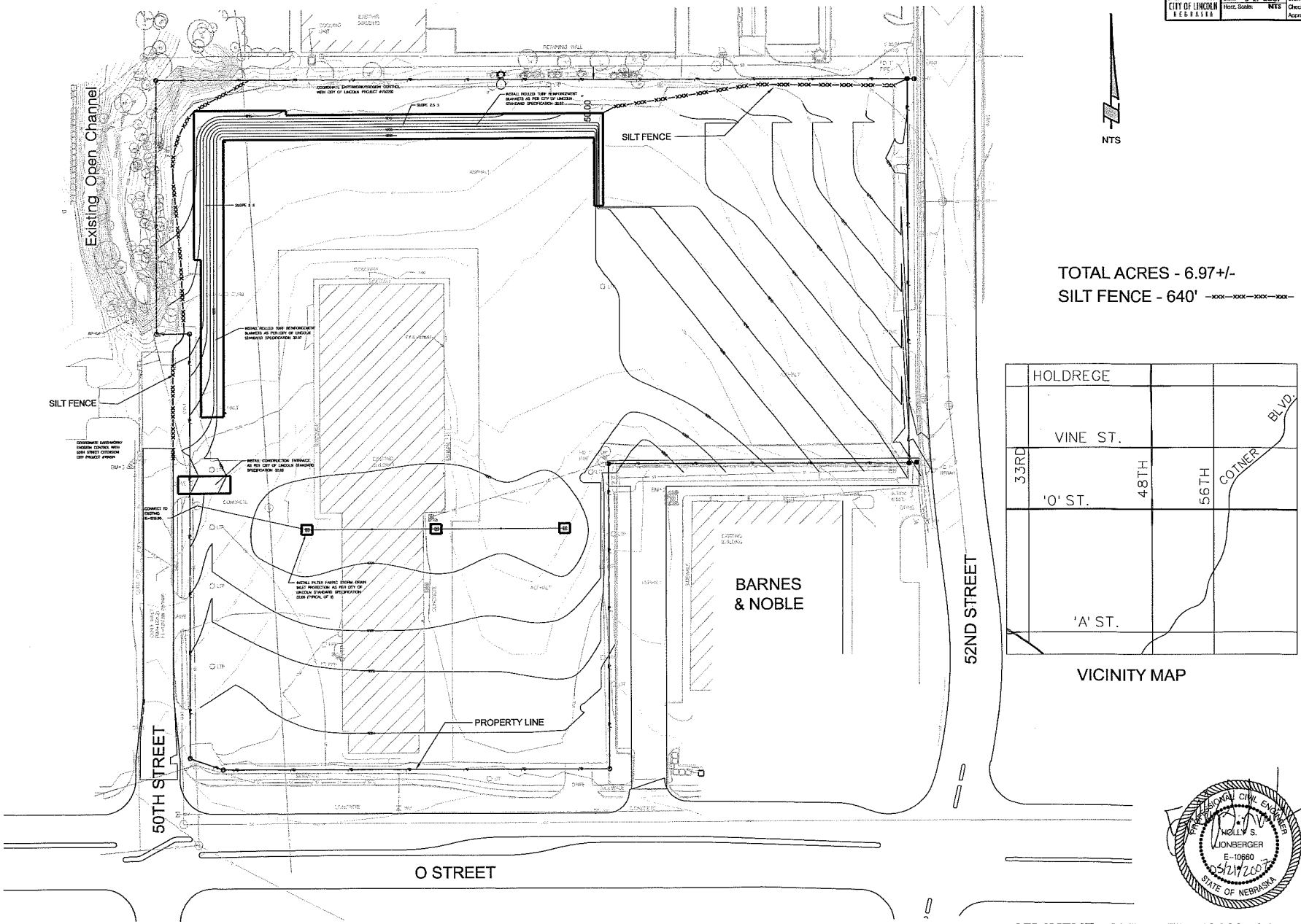
The undersigned certifies this plan has been designated in accordance with federal NPDES guidelines and approved erosion, sediment and stormwater ordinances, programs, regulations, standards and criteria of the City of Lincoln.



Holly Lionberger, P.E.
City of Lincoln Project Manager
Public Works & Utilities Engineering Services

PROJ: No Projection
PEN: ...\tables\PenSW_PENTABLE.TBL
USER: BICUWH
DATE: 05/21/2007
DGN: ...\Sht - 0 to INSWPPP\SWPPP.DGN

CITY OF LINCOLN NEBRASKA	PROJECT NO.	SHEET NO.
	NA	1 of 1
	Date: 5-21-2007	Drawn:
	Horz. Scale: NTS	Checked:
		Approved:



SEDIMENT AND EROSION CONTROL

SOIL EROSION AND SEDIMENT CONTROL

The following are modifications or additions to parts of Chapter 32 – Soil Erosion and Sediment Control, of the City of Lincoln Standard Specifications For Municipal Construction:

The erosion and sediment control measures shown on the plans were put in place to minimize erosion and minimize discharge of sediment in stormwater runoff. Protect adjacent properties, any identified endangered or threatened species or critical habitat, any identified cultural or historic resources, and receiving water resources from erosion and sediment damage until final stabilization is complete and permanent vegetative cover of sediment and erosion control is established.

An updated copy of the stormwater pollution prevention plan shall be available on-site during construction of the area. If during construction these measures prove to be inadequate in controlling erosion and sediment discharge or if it is determined that areas not identified on the plan are in need of erosion or sediment control, measures will be put in place as directed by the Engineer. The Contractor shall update the plan each time there are significant modifications to the plan.

Notifications

The Lower Platte South Natural Resources District (LPSNRD), having regulatory jurisdiction over storm water discharges from construction projects, must be notified at the following junctures of the project. Notification forms are available from the LPDSRD and the City of Lincoln.

1. This Stormwater Pollution Prevention Plan and the accompanying NPDES Genral Permit Application form constitute the "Notice of Intent" (NOI) for this project.

2. A "Notice of Start-up of Construction/Land Disturbing Activity" shall be filed prior to the beginning of construction for the project. It is the contractor's responsibility to inform the responsible individuals at the City of Lincoln (see NPDES General Permit Application) that construction is commencing, at least 72 hours prior to the actual start of construction activities. The responsible individuals at the City of Lincoln shall then submit the "Notice of Start-Up of Construction/Land Disturbing Activity" to the LPSNRD. This notice consists of the one-page CSW-START form and is available from the Lower Platte South Natural Resources District and the City of Lincoln.

3. If there are changes or updates to the Stormwater Pollution Prevention Plan, the Contractor shall notify the responsible individuals at the City of Lincoln and the LPSNRD of those changes. Changes shall be coordinated with and approved by the LPSNRD.

4. A "Notice of Completion of Construction/Land Disturbing Activity" shall be filed after all phases ore segments of construction are completed and permanent site stabilization has been achieved at all construction sties. It is the Contractor's responsibility to inform

the responsible individuals at the City of Lincoln (see General Permit Application) that construction and site stabilization are completed within 72 hours of the completion of construction activities. The responsible individuals at the City of Lincoln shall then submit the "Notice of Completion of Construction/Land Disturbing Activity" to the LPSNRD. This notice consists of the one-page CSW-END form and is available from the LPSNRD and the City of Lincoln.

5. The Contractor is responsible for maintaining a copy of the Stormwater Pollution Prevention Plan, as well as all inspection notes at the site. The Contractor should designate a responsible person on the job site to manage the implementation of the Stormwater Pollution Plan, as well as coordinate with LPSNRD personnel during on-site inspections.

Construction Notes

This sediment and erosion control plan is intended as a general guide for implementing erosion control measures for this project. Suggested practices, structures, and measures shown here are not necessarily all-inclusive. The Contractor bears full responsibility for compliance with the terms and conditions of the NPDES General Permit (NER100000) and applicable City of Lincoln, LPSNRD, NDEQ, and EPA regulations and guidelines.

1. Unless otherwise indicated, all vegetative and structural erosion and sediment control practices and stormwater management practices will be constructed and maintained according to the minimum standards and specifications of the Lincoln Drainage Criteria Manual, current edition and approved supplements.

2. Construction entrance/exit in compliance with the Lincoln Drainage Criteria Manual, current edition and approved supplements, shall be constructed by the Contractor at any point where vehicular traffic will be entering or leaving the construction site.

3. The Contractor shall implement construction techniques that utilize natural buffer areas consisting of existing vegetation at the perimeter of the construction site and adjacent to any natural discharge points to minimize or eliminate discharge of potential sediment from the construction site. Buffer areas shall be a minimum of 30-feet where practical and shall be used in conjunction with silt fence and other sediment control devices as part of the temporary erosion control plan.

4. The Contractor shall schedule clearing and grubbing activities on the project to limit the amount of disturbed or exposed ground that is susceptible to erosion. Cover crop seeding (or permanent seeding at areas where construction is complete and the time of year falls within the allowable seeding period) shall be implemented at all exposed areas where construction work has been completed or where further work will not be occurring within the next 21 days. As an alternate to cover crop seeding, the Contractor may cover exposed ground with temporary mulch.

5. Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures.

6. Where applicable, construction of erosion protection measures shall be completed prior to beginning of construction. Upon completion of construction and restoration of grade and vegetation in disturbed areas, contractor shall remove all temporary sediment control measures, clean out storm sewer inlets or drainage structures, excavate sediment deposits, re-grade, and seed and mulch disturbed areas.

7. The Contractor shall install and maintain temporary sediment control devices around all inlets to existing storm sewer system during the removal of the pavement and portions of the existing storm sewer. This may include installation of temporary silt fence or other approved sediment barriers at the end of the work day at open ends of existing storm sewers, inlets or manholes that are to remain in place to prevent discharge of material into the existing storm sewer system.

8. The Contractor shall install and maintain temporary sediment control devices around all ends of new storm sewers at the end of each work day to prevent discharge of sediment into the storm sewer system.

9. Contractor shall incorporate permanent erosion control features, paving, permanent slope stabilization, and vegetation into project at earliest practical time to minimize need for temporary controls.

10. Unless required within a shorter timeframe by the applicable General Permit for Storm Water Discharges Associated with Construction Activity, slopes that erode easily or that will not be graded for a period of 14 days or more shall be temporarily stabilized as work progresses with a cover crop as stipulated in the special provisions or by other acceptable means as directed by the Engineer. In the event it is not practical to seed areas, slopes must be stabilized with mulch and tackifier, bonded fiber matrix, netting, blankets or other means to reduce the erosive potential of the area.

Supplemental Notes

1. Deficiencies or changes on the drawings or Storm Water Pollution Prevention Plan shall be corrected or implemented as site conditions change. Changes during construction shall be noted in the Storm Water Pollution Prevention Plan and posted on the drawings.

2. Contractor shall clean vehicles and equipment before exiting construction site to prevent negative impacts to adjacent roads. Contractor shall clean any construction related sediment or debris from neighboring streets, on a daily basis, immediately after significant buildup or as required.

3. The Contractor shall be responsible for the maintenance of the sediment control measures until permanent stabilization and cover crop is established. Permanent cover is considered to be achieved when the ground is 90% covered by vegetation.

4. The Contractor shall conduct weekly inspections to determine the effectiveness of the sediment and erosion control measures. Inspections shall also be made within 24-hours following a rain event of 0.5 inches or greater. Inspections shall be documented by the contractor and shall include who conducted the inspection, findings of the inspection, and what corrective actions were required. Any necessary repairs or cleanup to maintain the effectiveness of the best management practices shall be made by the Contractor within seven (7) calendar days.

5. Spills of hazardous materials shall be contained and cleaned up immediately. Any contaminated soils or materials shall be removed and treated or disposed of (as appropriate) in accordance with NDEQ and EPA guidelines.

6. Upon completion of each phase, the Contractor shall assure all disturbed areas have been re-graded, stabilized, seeded, and mulched. Any areas that show signs of continued erosion shall be permanently stabilized before "Notice of Completion of Construction Activity" is submitted. Contractor shall clean up any sediment deposits or construction debris in, on, or around storm sewers and inlets, culverts, channels, streets, and construction sites.

Seeding Notes

1. Following soil disturbance, permanent or temporary stabilization shall be completed within seven (7) calendar days to the surface of all perimeter sediment controls, topsoil stockpiles, and any other disturbed or graded areas on the project site which are not being used for material storage, or on which actual earth moving activities are being performed.

END-OF-SECTION